Claims

[c1] A control system for an automotive vehicle having a steering actuator comprising:
a lateral dynamic sensor generating a lateral dynamic signal corresponding to a condition of the vehicle;
a steering wheel angle sensor generating a steering wheel angle signal;
a road wheel steer angle sensor generating a road wheel angle signal; and
a controller coupled to the steering actuator, the lateral dynamic sensor and the steering wheel angle sensor, said controller determining a desired yaw rate in response to the steering wheel angle signal, determining a corrected steering wheel input as a function of the desired yaw rate and the condition and the road wheel angle sensor, and controlling the steering actuator in response to the corrected wheel steering angle, the desired yaw rate and the modified steering wheel input and the road wheel angle sensor.

[c2] A system as recited in claim 1 wherein said steering actuator comprises a front right wheel actuator and a front left wheel actuator.

[c3] A system as recited in claim 2 wherein said front right wheel steering actuator and said front left steering actuator are independently controllable.

[c4] A system as recited in claim 3 wherein said controller generates a front right control signal and a front left control signal in response to the corrected steering wheel input, the condition and the modified steering wheel input.

[c5] A system as recited in claim 1 further comprising a lateral acceleration sensor generating a lateral acceleration signal, a speed sensor generating a vehicle speed signal, said controller determining a corrected steering wheel input as a function of the desired yaw rate and the vehicle condition, the lateral acceleration signal and the vehicle speed signal.

[c6] A system as recited in claim 1 wherein said steering actuator comprises a rear steering actuator and a front steering actuator.

[c7] A system as recited in claim 1 wherein said controller determines a rear steering control signal in response to the corrected steering wheel input, the yaw rate

and the modified steering wheel input.

[c8] A method of controlling a vehicle having a steering actuator comprising:
measuring a steering wheel angle from a steering wheel angle sensor;
measuring a steering actuator position from a road wheel position sensor;
determining a desired yaw rate in response to the steering wheel angle;
determining a modified steering wheel input in response to the desired yaw rate;
measuring a vehicle lateral dynamic from a condition sensor;
determining a corrected steering wheel input as a function of the desired yaw rate and the lateral dynamic condition; and
controlling the steering actuator in response to the corrected steering wheel input, the lateral dynamic condition and the modified steering wheel input.

[c9] A method as recited in claim 8 further comprising generating a lateral acceleration signal from a lateral acceleration sensor, generating a vehicle speed signal from a speed sensor, wherein determining a corrected steering wheel input comprises determining a corrected steering input as a function of the desired yaw rate and the lateral dynamic condition, the lateral acceleration signal, the desired yaw rate, and the vehicle speed signal.

[c10] A method as recited in claim 8 wherein controlling the steering actuator comprises controlling a front steering actuator in response to the corrected steering wheel input, the lateral dynamic condition, the desired yaw rate, and the modified steering wheel input.

[c11] A method as recited in claim 8 wherein controlling the steering actuator comprises controlling a rear steering actuator in response to the corrected steering wheel input, the lateral dynamic condition, the desired yaw rate, and the modified steering wheel input.

[c12] A method as recited in claim 8 wherein controlling the steering actuator comprises controlling a front right steering actuator in response to the corrected steering wheel input, the lateral dynamic condition, the desired yaw rate, and the modified steering wheel input.

[c13] A method as recited in claim 8 wherein controlling the steering actuator comprises controlling a front left steering actuator in response to the corrected steering wheel input, the lateral dynamic condition, the desired yaw rate, and the modified steering wheel input.

[c14] A method of controlling a vehicle having a steering actuator comprising:
measuring a steering wheel angle from a steering wheel angle sensor;
determining a desired yaw rate in response to the steering wheel angle;
determining a modified steering wheel input in response to the desired yaw rate;
measuring a vehicle yaw rate from a yaw rate sensor;
determining a yaw rate error as a function of the desired yaw rate and the vehicle yaw rate;
determining a corrected steering wheel input in response to the yaw rate error;
determining a steering actuator input as a function of the corrected steering wheel input and the modified steering wheel input; and
controlling the steering actuator in response to the steering actuator input.

[c15] A method as recited in claim 14 further comprising generating a lateral acceleration signal from a lateral acceleration sensor, generating a vehicle speed signal from a speed sensor, wherein determining a corrected steering wheel input comprises determining a corrected steering input as a function of the desired yaw rate and the vehicle yaw rate, the lateral acceleration signal and the vehicle speed signal and other inputs.

[c16] A method as recited in claim 14 wherein controlling the steering actuator comprises controlling a front steering actuator in response to the corrected steer angle input, the vehicle yaw rate and the modified steering wheel input.

[c17] A method as recited in claim 14 wherein controlling the steering actuator comprises controlling a rear steering actuator in response to the corrected steer angle input, the vehicle yaw rate and the modified steering wheel input.

[c18] A method as recited in claim 14 wherein controlling the steering actuator comprises controlling a front right steering actuator in response to the

corrected steering wheel input, the vehicle yaw rate and the modified steering wheel input.

[c19] A method as recited in claim 14 wherein controlling the steering actuator comprises controlling a front left steering actuator in response to the corrected steering wheel input, the vehicle yaw rate and the modified steering wheel input.

[c20] A method as recited in claim 14 wherein controlling the steering actuator comprises controlling a rear left steering actuator in response to the corrected steering wheel input, the vehicle yaw rate and the modified steering wheel input.

[c21] A method as recited in claim 14 wherein controlling the steering actuator comprises controlling a rear right steering actuator in response to the corrected steering wheel input, the vehicle yaw rate and the modified steering wheel input.

[c22] An automotive vehicle having a steering road wheel actuator comprises:
a yaw rate sensor generating a yaw rate signal corresponding to the yaw rate of the vehicle;
a steering wheel angle sensor generating a steering wheel angle signal;
a feedback and feed forward controller coupled to the steering road wheel actuator using inputs from the yaw rate sensor and the steering wheel angle sensor, the feed forward controller calculates a desired yaw rate in response to the steering wheel angle, and determines a corrected steering wheel input as a function of the desired yaw rate, the feedback controller then compares the actual desired vehicle yaw rate, and controls the road wheel steering actuator in response to the corrected steering wheel input, the yaw rate and the modified steering wheel input to provide a steering angle that will result in a desired vehicle dynamic response.